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ABSTRACT

This guide discusses how computers can be integrated into the writing process. The guide includes sections on stages of the writing process (pre-writing, writing, response, revision, and recognition); letters from children using computers for projects and communication with other children; and a review of some word processors and writing tools. The guide concludes that word processing and prompted writing tools can offer effective support for classroom writing instruction. (MS)

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Report #11

Integrating Computers and the Writing Process

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Integrating Computers and the Writing Process

Authorities on children's writing remind us that effective instructional programs treat writing as a process, not an isolated exercise (Florio-Ruane and Dunn, 1985; Cooper and Odell, 1978; Graves, 1978; Moffit and Wagner, 1976). With teacher guidance, students advance through stages to produce a complete composition. Students should be encouraged to write for different purposes (i.e., descriptive, narrative, expository, poetry), about issues important to them and for audiences they care about. In the following section, ways in which word processors and prompted writing systems can have direct application in the stages of the writing process will be described:

Stages of the Writing Process

1. Pre-writing
2. Writing
3. Response
4. Revision
5. Recognition

Pre-writing. Prior to composing on paper or on the computer, students meet as a group to brainstorm ideas for a particular topic. This discussion might identify appropriate descriptive words or explore how to organize the writing task. Some writing activities are appropriate for composing at the keyboard (i.e., short messages, answers to peer questions or opinions on an issue), while others should be more carefully outlined prior to entering the text (i.e., a story or article for a school newspaper). Students facing a blank sheet of paper or screen may need additional assistance in generating ideas to write about. Task cards which ask probing questions or give interesting topics to write about can be helpful aids. Interactive writing software described in the next section is now available which gives on-screen

prompts to assist students in generating ideas for writing.

Writing. After the pre-writing activities, students compose the first draft of their text. It should be emphasized that this process is one of putting ideas on the screen (or on paper) and should not be seen as the final product. The computer has been found to be a motivating factor during this stage for students who are reluctant to write on paper. Either alone or in pairs, students enter their compositions and save them on disk. Students can make multiple printed copies for use during the Response stage in the writing process.

Response. The next stage is for peers to form groups to react to each other's writing. This step has often been reserved for the teacher in the past, reducing young authors' audiences and the range of possible reactions. Feedback can be given to authors during whole-class response sessions or in small groups. The teacher, or another good reader, can read each composition out loud. Students then make suggestions about each and the author makes notes on their own printed copy for later revision. Response can include comments on the ideas presented as well as grammar, punctuation and spelling changes which the writer should consider. Students initially focus on only one aspect at a time during these sessions. For example, response groups might meet 3 times before the author makes final revisions. The first time the group might respond only to the ideas presented. During the second session, text could be examined for proper use of grammar, spelling, capitalization and punctuation. For the final session, dates, quotes and format might be reviewed.

Revision. Just as professional authors revise and edit their work

prior to publication, so too should novice writers. Editing with pencil and paper can cause groans in most writing classes. However, by utilizing the unique capabilities of the word processor, students are more willing to make changes in their work. Students introduce fewer new errors while making corrections using the computer. Also the final product looks so professional that students are more likely to share their work at school and at home. Revision generally takes place after response groups have met and analyzed the individual compositions. In the classroom, there is often not enough computer time for each student to revise their text directly on the computer. In such cases, planned revisions are first marked on the printed drafts. Writers can then use the computer to quickly make the necessary editorial changes using the printed copy as a reference. The final draft can be saved on disk and printed.

Recognition. In this often overlooked stage of the writing process, writing is evaluated and shared with others. Traditionally, when writing at school, students write and teachers correct. The writing process described here encourages more input from peers and from other adults such as aides and parents. There are various forms of writing evaluation. The procedures depend on the purpose of the evaluation and the evaluator's skills. For example, a test on language mechanics is more valuable as an indication of students' editing skills than their composing abilities. A number of evaluation techniques are available for assessing the quality of student writing (i.e., analytic scoring, holistic scoring or primary-trait scoring). Students generally find it helpful to evaluate their own work and that of their peers. Prior to evaluating each other's work, it is important for students to understand the audience and purpose of each writing assignment, the type of

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evaluation, and the need to have "clear" reasons for their comments.

Recognition can take the form of the presentation of writing in class books, school newspapers or work displayed on classroom bulletin boards, at the district office, in community markets or public buildings. Teachers with access to a modem and communication software are able to open a much wider audience to their student writers. By linking together computers in different places over telephone lines, students can share their ideas and writing outside the four walls of their classroom. This capability, previously available only to large institutions, now enables students to communicate over inexpensive computer networks with students across town or around the world.

Several classrooms in California have been exchanging letters regularly with their "computer pals" at schools in Alaska and other places around the world. These classrooms have also been participating in a "computerized newspaper" network, Students write articles on the computer and exchange disks with other participating schools. Each school produces its own local edition of the Computer Chronicles Newspaper which include stories written locally and by students from other schools (Riel, 1983). The following are typical examples of letters and articles exchanged by the upper-elementary and middle school students:

Dear Computer Pal,

I am in the 5th grade here in Wainwright. It is very cold outside today. Our temperature is 14 degrees below zero. What is it like in your town? The sun went down on November 18 and will not be back until January 24. It is like night all day long. Today our janitor shot a rabid white fox on our back steps. I'm glad we were not out at recess.

We like to eat muktuk and frozen fish. We also like warmed caribou blood to drink. Muktuk is whale skin. To us it tastes good. We had a feast at the high school on Thanksgiving. We had duck soup, caribou soup, frozen fish and muktuk. What did you eat?

Well I don't have anything else to say. Write to me on this computer. My teacher, Mr. Vancil, says he will help me read your letter.

Good-by,
Fritz
Wainwright, Alaska

Cutting Ice

At about the middle of October, everyone goes out of town one mile to the ice pond to cut ice. To cut the ice you have to take a big saw and cut the ice. After you have about 5-6 pieces, you load them onto your sled, take them home and put them in your ice cellar for summer. An ice cellar is like an underground shack. Here in Wainwright there is a permafrost in the dirt so the ice cellar keeps the ice frozen all summer.

Ward
Alak High School
Wainwright, Alaska

Dear Charlene,

My name is Armando and I'm 11 years old. I am in the fifth grade and am a boy. Tell me how the sun rose. I'm part Mexican and part American. What are you? Do you ever think Sitka will sink? Does it feel nice living on an island? Do you have a pet? Do you have a brother or sister? What school do you go to? What grade are you in? What is your teacher's name? How old are you? Do you have lots of friends? Do you do lots of work? Have you seen the movie E.T.? Do you like being a pen pal with a boy? Where were you born? Do you like books? Please write to me soon.

Your Friend,
Armando
Olive School,
Vista, California

Weather

The weather here in Oceanside has been extremely warm and sunny!!!!! In the morning it is usually cold and foggy but it wears off in the afternoon. It has been sunny and fair with clouds. Mostly nice to swim and go to the park. You can't dress heavy.

Joanne and Jeff
Garrison School,
Oceanside, California

Computer Software For Writing

Classroom Word Processing. Word processing was invented in response to the need for increased efficiency in managing business correspondence and reporting. Word processors enable writers to enter text into a computer's memory and simultaneously display it on the monitor screen. The system has an advantage over a typewriter in that undetectable corrections can be easily made while entering text, or later as part of the revision process. Text can be easily moved within a file and several files can be "merged" to form a single composition. Additional advanced features such as find-and-replace enable writers to experiment with their work in ways that would be impossible using conventional technology. For example, a young writer might systematically change the name of a character in a story using a command which enables the computer to find every instance of a word (i.e., the character's name) and replace each with a new word (i.e., a new name). While such an effort would be possible using a typewriter, no one would undertake the task in the name of experimentation. Finally, when the composition is in the desired form and is error free, it can be printed on paper or distributed electronically via telecommunications.

The use of word processors in classrooms is a fairly recent phenomenon (Mehan, et al, 1986). Their introduction in K-12 education has been prompted

by the availability of inexpensive computing devices and a significant improvement in word processing software. A number of good quality word processors are available which are specially designed for ease of use. **The Writer's Assistant** (Encyclopaedia Britannica Educational Corp.) and **FrEdWriter** (CUE Soft Swap) are two examples of systems which have been successfully implemented in K-12 classrooms.

The Writer's Assistant was adapted from an early version of the Pascal System Editor under the guidance of James Levin at the University of California, San Diego. It contains several features which make it especially useful for writing instruction in the upper elementary and secondary grades. The word processor can be set to three levels of sophistication -- Novice, Intermediate and Expert. At the first level, only basic word processing features are available (Insert, Drop, Help and Quit). Studies have shown that beginners gain confidence quicker when using a system that does not allow them to get into trouble. Later, as student skill develops, more advanced features can be "turned on" as required. At the Expert level, **The Writer's Assistant** serves as a full-feature system with on screen formatting, multiple search capabilities, a small spelling checker and file merging capabilities. This word processor can be introduced in grade 3 or earlier and still be useful when the student reaches secondary school (i.e., this paper was prepared using **The Writer's Assistant**).

FrEdWriter (Rogers) was developed as a "public domain" word processor for education at the San Diego Teacher Education and Computer Center. The system was adapted from an early version of **Apple Writer** (Lutus). **FrEdWriter** (FreeEducationWriter) is a basic word processor which allows students to easily create, save and print documents. It also contains an "on-

line" tutorial to remind novice writers of command features. Some advanced features are available which allow users to move small amounts of text, search for and replace words, and merge several files into one larger composition.

Prompted Writing. Early research on the classroom use of word processors indicated that the "blank page" phenomenon experienced by many novice writers during the initial stages of writing on paper was also apparent when the computer was employed as the composition medium (Levin, et al, 1984). Quality writing instruction generally employs a range of pre-writing experiences to assist students in generating ideas, identify appropriate vocabulary and organize concepts. Such teachers employ a system of "dynamic support" for writing instruction, whereby novices are initially responsible for making only high level decisions on, for example, character selection and story plot, while the details of the composition (i.e., vocabulary, syntax, paragraph structure) are managed by the curriculum designer or instructor. An example of this type of writing are books which have multiple decision points throughout the text from which the reader (writer?) selects the direction of the plot. Dynamic support implies that through a carefully selected series of lessons, the students are gradually given more and more responsibility for coordination of elements within the composition until they are writing on their own (Vygotsky, 1962; Riel, Levin and Miller-Souviney, 1984; Heap, 1986).

A series of studies addressing ways to use computers to enhance the ability of instructors to employ dynamic support when teaching writing have been carried out by members of the Interactive Technology Laboratory at the

University of California, San Diego and local classroom teachers. An authoring system called the "Interactive Text Interpreter" (Levin and Reiswig) has been designed which enables displayed text to be used for two different purposes: 1) it can be displayed as direction prompts only, or, 2) prompts can also be included as part of the writer's composition. As a result of these efforts, a series of **Interactive Writing Tools** (InterLearn and Encyclopaedia Britannica Educational Corp.) were created for classroom use. The **Narrative Writing Tool** (Riel, et al) offers a good example of how dynamic support for narrative writing can be supplied by computer software.

The **Narrative Writing Tool** contains four writing experiences which are structured to provide varying amounts of support during composition. Generally, teacher directed pre-writing activities are carried out with the whole class before students take turns at the computer. The four narrative topics are:

1. Science Fiction Story
2. Treasure Hunt
3. Animal Dialogue
4. Story Prompter

The first activity, "Science Fiction Story," presents writers with lists of phrases from which to choose. Each choice determines the subsequent direction of the science fiction adventure story. When completed, each writer has created a unique composition in which the student has had control over the development of the plot while the machine has managed the grammatical and syntactical details. For example, the opening frame offers the writer the following three choices of location:

It was a lazy summer afternoon in

1 San Diego
2 Sausalito
3 Slippery Rock
Choose (1..3; 0 to end):

*** Type a number then push CTRL-C ******

This selection is followed by several lines of contextual details and a choice which determines the direction of the plot:

It was a lazy summer afternoon in Slippery Rock. You lay next to the river, its waters rushing over rocks keeping time to the music on your radio.

Suddenly, a voice came on the radio to announce that

1 government scientists
2 Earth was being attacked by
Choose (1..2; 0 to end):

*** Type a number then push CTRL-C ******

The following is part of a completed "Science Fiction" story. The only text actually entered by the student (underlined) is the author's name which was requested prior to the first selection:

A Science Fiction Story

by

Rebecca

It was a lazy summer afternoon in Slippery Rock. You lay next to the river, its waters rushing over rocks keeping time to the music on your radio.

Suddenly, a voice came on the radio

```
to announce that Earth was being
attacked by mind-reading pulsating mold
cells which don't understand us and were
very scared.  They could not be killed by
a crowd of chickens with torches, so
finally they decided to live in
Disneyland forever.  If you look ...
```

"Treasure Hunt" further engages students in the writing process by requesting that details be entered to complete ideas within a structure provided by the program. In this activity, writers are asked to supply phrases and sentences which reflect their interests and opinions while searching for a buried treasure. A modest amount of the text is entered by the student in "Treasure Hunt" while in "Science Fiction Story," all text is selected by the writer from phrases provided by the program. The story opens with the following choice:

```
     Your great
--------- passed away

 1 grandfather
 2 grandmother
 3 old uncle
 4 old aunt
Choose (1..4; 0 to end):

*** Type a number then push CTRL-C ******
```

Connecting details are filled in by the program followed by periodic requests for information:

```
     Your great grandfather just passed
away and left a sealed envelope with
your name on it.  You eagerly open the
tattered old envelope expecting to find
(What do you expect to find?)
?

*** Type, then push CTRL-C when done *****
```

You eagerly set sail and soon
the S.S. Minnow drops you on the
shore of the Treasure Island! As
you climb out of your
(Enter a type of boat.)
?

*** Type, then push CTRL-C when done *****

The following story is part of the printout of a "Treasure Hunt" story. The underlined text was entered by the student:

Treasure Hunt

by

Rebecca

Your great grandfather just passed away and left a sealed envelope with your name on it. You eagerly open the tattered old envelope expecting to find a dusty old will. To your suprise you find a fine old leather pouch and a letter.

You immediately open the pouch and find a ticket for the S.S. Minnow and a treasure map. You place the folded map in your pocket and immediately begin making plans for your trip.

You eagerly set sail and soon the S.S. Minnow drops you on the shore of the Treasure Island! As you climb out of your sloop, you wonder what kind of riches and excitement await you.

Your first clue takes you in search of an oak tree ...

The third activity, "Animal Dialogue," helps students create stories about what the animals in a zoo might be thinking while watching the people visiting the zoo. The story structure and some of the characters are provided by the program but much of the plot is created by the writer. Some on-screen prompts provide suggestions throughout the composition process. The first

choice, which establishes the setting, is followed by a request for information:

```
     During the summer, thousands of
visitors from all over the world come
to the

 1 San Diego Zoo.
 2 Bronx Zoo.
Choose (1..2; 0 to end):

*** Type a number then push CTRL-C ******

             --------------

     Just think what it is like for
the animals to have these strangers
staring, laughing and
(What else do people do?)
?

*** Type, then push CTRL-C when done *****
```

In the following example of an "Animal" essay, the text entered by the student is underlined:

Who is Watching Whom?

by

Rebecca

During the summer thousands of visitors from all over the world come to the San Diego Zoo.

Just think what it is like for the animals to have these strangers staring, laughing and running about in their garden. Well, it's embarrassing. But now, the animals have decided to form a club called The People Watchers. Every afternoon they get together to stare, laugh and talk about all the silly and funny looking humans that come to the zoo. Shhh, they are just getting together. If we are quiet, we can hear

what they are saying about the humans.

Leo the Lion walks up to his good friend, Mange the Wambat, and says, "I think that one could use a haircut, don't you."

This makes Leo's friend lose his contacts, he laughs so hard and he replies, "You could stand a trim yourself, fella."

Lester the Lion pokes his head out from under his mother. Lester says, Let's ask him in for a trim." They get into ...

Finally, "Story Prompter" is a general purpose narrative writing environment which provides minimal on-screen prompting to assist with the overall structuring of the composition (i.e., title, introduction, body, conclusion). Students must create the characters, setting, plot and details for the entire narrative composition. This activity shifts to the student most of the responsibility for coordinating elements in the composition. The underlined text indicates that nearly all the composition was entered by the writer in this activity.

The introduction tells where the story takes place. The main characters are introduced, and the place and time where the story starts (the setting) are described.

*** To continue, push CTRL-C **********

The Foggy Beach

by

Rebecca

It was one of those windy days when the ocean seemed to reach up and grab you. The fog left only enough room for one person at a time to walk on the beach. It was cold and I should have worn another sweater to help stop my

hands from shaking. It wasn't a loud noise but it sounded like the time the milk truck ran over the neighbors cat, only different somehow.

I wasn't sure why but I walked a little faster after I heard the noise the first time. It seemed to be coming from the surf at first. As I approached where the sound seemed to come from, I heard it again, further down the beach. It seemed to be calling to someone but I was the only one on the beach. At least that is what I thought.

This computer-supported writing system is unique in that it allows students to save their work on disk for use during response groups and for later revision using **The Writer's Assistant**. After completing one or more sessions at each of the four levels of support, students are then encouraged to create narrative compositions using the word processor, or on paper. The results of several studies using dynamically supported writing environments have shown significant improvement in writing fluency, quality and grammatical accuracy (Miller-Souviney, 1985; Riel, et al, 1984).

FrEdWriter also has a special "prompting" feature which was designed by Bruce Fluery, a teacher in San Diego. Using simple commands, teachers can construct on-screen prompts to provide directions for student writing. These prompts are displayed in "protected" boxes which cannot be easily changed by the student writer. Due to an effort to make the authoring system easy to use, the writer must employ the sequence of prompts in a linear fashion from the first prompt to the last. FrEdWriter prompts can be effectively employed for simple writing tasks. For example, the following sequence of prompts and student responses generate a descriptive paragraph about a favorite place (Atkerson and Fares, 1986). Note that the "prompts" are in the starred boxes and the student enters responses between the boxes.

FrEdWriter Prompted Writing Episode

```
*****************************************
**
**          A DESCRIPTIVE PARAGRAPH
**              the first draft
**
**     Answer each questions with at
**     least one sentence.  Use your
**     clusters to help you think of
**     ideas
**
*****************************************
```

```
*****************************************
**
**     COPY AND COMPLETE THE FOLLOWING
**     SENTENCE AS YOUR TOPIC
**     SENTENCE:
**     My special place is _____.
**
**  The place I remember best is ____.
**
*****************************************
```

My special place is Bates Nut Farm.

```
*****************************************
**
**    DESCRIBE HOW YOUR PLACE LOOKS.
**
*****************************************
```

Bates Nut Farm is in Valley Center. It has two brown buildings and one house. There are fenced up animals there.

```
*****************************************
**
**     DESCRIBE THE FIRST THING OR
**     PERSON YOU SEE WHEN YOU ENTER
**     YOUR PLACE.
**
*****************************************
```

When I get to Bates Nut Farm I see the animals first then I see two brown stores and one house.

```
****************************************
**
**      DESCRIBE TWO OTHER THINGS OR
**      PEOPLE YOU SEE AT YOUR PLACE.
**
****************************************
My favorite animal is the soft white
rabbit.

****************************************
**
**      DESCRIBE ANY PARTICULAR SMELLS
**      AT YOUR PLACE.
**
****************************************
I love the smell of fresh hay and
buttery popcorn at Bates Nut Farm.

****************************************
**
**      DESCRIBE ANY SOUNDS AT YOUR
**      PLACE.
**
****************************************
My brother and I laugh loudly. We hear
the geese honking when we feed the other
animals.

****************************************
**
**      DESCRIBE ANY ACTIVITIES YOU
**      DO AT YOUR PLACE
**
****************************************
At Bates Nut Farm my brother and I play
tag together.

****************************************
**
**      DESCRIBE HOW YOU FEEL WHEN
**      YOU'RE AT YOUR PLACE.
**
****************************************
I feel delightful when I get to Bates
Nut Farm.
```

FrEdWiter allows students to print and save their files without the prompt boxes. The following paragraph is the result of the descriptive writing episode above:

Descriptive Paragraph (Grade 4)

My special place is Bates Nut Farm. Bates Nut Farm is in Valley Center. It has two brown buildings and one house. There are fenced up animals there. When I get to Bates Nut Farm I see the animals first then I see two brown stores and one house. My favorite animal is the soft white rabbit. I love the smell of fresh hay and buttery popcorn at Bates Nut Farm. My brother and I laugh loudly. We hear the geese honking when we feed the other animals. At Bates Nut Farm my brother and I play tag together. I feel delightful when I get to Bates Nut Farm.

A series of grade 3-12 model lesson plans like this "Descriptive Paragraph" example have recently been designed by classroom teachers in the San Diego area using the prompting feature of **FrEdWriter**. These materials focus on the writing process and the use of literature in teaching writing. These model lessons will are available through CUE Softswap at the San Mateo County Office of Education. **Narrative Writing Tool, The Writer's Assistant** and **FrEdWriter** are also three of the software packages included on the California State Department of Education, Technology In the Curriculum (TIC) Recommended Software List. Along with several other products, these writing tools are part of the TIC Software Package distributed in 1986 to schools throughout the State.

Summary

Teachers are beginning to discover ways in which computers can be effectively employed to support writing instruction in the classroom. Computers have been effectively integrated into various stages of the writing process in actual classroom settings. Their use can enhance pre-writing

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experiences, motivate composition of the first draft, facilitate the revision and editing of text, and assist with the preparation of final products for sharing with others.

Word processors, originally designed as productivity tools for business, have been adapted for use by novice writers. New prompted writing tools are now available which help student authors brainstorm ideas for writing, organize and revise text, and print their final compositions. These tools provide dynamic support for writing instruction by gradually shifting responsibility for text entry and organization from the computer to the student author. The goal of these prompted environments is to allow users of varying abilities to produce good quality compositions in cooperation with a computer until they gradually become capable of coordinating all the elements of the task on their own.

Conclusion

Word processing and prompted writing tools can offer effective support for classroom writing instruction. In addition, writing on the computer offers an attractive alternative to programming and drill-and-practice for the introduction of this exciting new technology into classrooms (Levin and Souviney, 1983). The computer can be a powerful tool when used in conjunction with the writing process. We know that computers are not very good at judging the quality of writing, nor do they adequately interpret the human emotions evident in an author's work. No computer has yet been programmed to recognize a good joke when it sees one. However, an easy-to-use word processing system and other interactive writing tools can help busy teachers reinforce good

writing habits. As a writing environment, the computer can offer students greater freedom to express their ideas by facilitating the invention, revision and publication of compositions.

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